The Examiner is respectfully requested to consider the Information Disclosure Statement filed December 30, 1998, and the five references cited therein so they will appear on the Letters Patent when issued. If the Examiner cannot locate the Information Disclosure Statement, he is requested to contact the undersigned.

In paragraph 7, on page 3 of the Office Action, claims 1-5 are rejected under 35 U.S.C. §102(b) as being anticipated by Bobo, U.S. Patent No. 5,088,888. The rejection is respectfully traversed.

The invention provides an active tip clearance system, controlled by an outer plenum of pressurized air. Because the outer plenum can be vented to the atmosphere quickly to effect a rapid increase in clearance between the seals and the turbine blades, it is important that a good barrier be provided between the plenum and the turbine blades to inhibit the passage of hot gas from the gas path into the plenum. Applicants' invention adopts an array of hollow boxed-section liners to create what is a second plenum capable of changing diameter in which pressure is constantly higher than the core flow thereby inhibiting the flow of gas from the core to the main plenum regardless of the pressure therein.

Specifically, Applicants' claimed invention includes an annular plenum chamber formed between an annular arrangement of a plurality of shroud liners on the inner circumference of the chamber and a generally cylindrical casing on the radially outer side, and, in use, a hot gas stream located radially inwards of the shroud liners, wherein each shroud liner comprises a hollow box section comprising upstream and downstream walls, radially inner and outer walls, and side walls, at least the downstream wall and the radially outer wall being closed, the upstream wall having an air inlet aperture, and at least one of the side walls having at least one outlet aperture, and a means for flow communication providing flow

communication between the inlet aperture and a source of high pressure air at a pressure higher than that of the hot gas stream.

Bobo disclose no such structure. Bobo provides an improved seal between adjacent segments of a turbine shroud but focuses on the turbine shroud segments and the gap therebetween and not the invention of as a whole claimed by Applicants. The focus on a hanger 28 and the base 18 is solely to a box section or a shroud section.

Bobo discloses that the hanger 28 "would also be provided in segments in the case of engine designed for high temperature operation" (col. 3, lines 30-32) and that "Each hanger segment 28 provides with one or more shroud segment cavities 41" (col. 3, lines 40-42). However, there is no disclosure of an arrangement in which each hanger 28 cooperates with each shroud section to form Applicants' claimed structure of a shroud liner comprising a hollow box section. Outwardly from the hollow box sections is an annular plenum chamber 50 in Applicants' claimed invention. In Bobo, the plenum chamber is part and parcel of the shroud segment cavity although it may be associated with more than one such cavity. There is no plenum chamber shown external, that is, between the annular arrangement of a plurality of shroud liners, each shroud liner comprising a hollow box section comprising upstream and downstream walls, radially inner and outer walls and side walls, and a cylindrical casing on the radially outer side. The only plenum chamber shown by Bobo is 41 which is, as previously noted and as described by Bobo, associated with each shroud segment cavity 26 which are found in the shroud base sections 16. The upper part of the overall shroud is formed by the hanger segment 28.

Bobo clearly states that the hanger 28 is supported by the engine outer case (see col. 3, lines 32 and 33). As such, there is no showing, nor does Bobo attach any importance

to a plenum lying between the liner and the radially outer casing as found in the claimed invention. In point of fact, Bobo specifically states that it does not show how the hanger is supported by the engine outer case indicating its lack of importance.

As Bobo does not literally disclose each and every feature of Applicants' claimed invention, a rejection under 35 U.S.C. §102 is inappropriate. Further, for the reasons discussed, Bobo does not suggest the claimed invention.

In paragraph 8, on page 3 of the Office Action, claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bobo in view of either Proctor et al., U.S. Patent No. 5,641,267 or British Patent No. 1 484 288; in paragraph 9, on page 4 of the Office Action, claim 10 was rejected under 35 U.S.C. §103 as being unpatentable over Bobo in view of British Patent No. 2 313 414; and in paragraph 10, also on page 4 of the Office Action, claim 9 was rejected under 35 U.S.C. §103(a) being unpatentable over Bobo in view of British Patent No. 2 313 414 and either Proctor et al. or British Patent 1 484 288. The rejections are all respectfully traversed.

Proctor et al. is cited for disclosing bleed apertures and is actually directed to a manner of fitting a shroud panel for a turbine shroud into forward slot 46 while minimizing tolerances. British Patent No. 1 484 288 is also cited for bleed apertures and is directed to a manner of controlling expansion and contraction of a sealing ring 21 using first annular sealing member 19 and second annular sealing member 21 having different masses and expansion coefficient. British Patent 2 313 414 is cited for using a high pressure bleed system during the passage of hot gas from the gas stream into the plenum chamber. Specifically, it discloses a series of pressure and electrical controlled valves to control movement of a plate-like shroud liner segment relative to an inner casing 4. Thus, none of the additional applied references

overcome the deficiencies of Bobo or in any way suggest the structure of Applicants' invention of claim 1, either alone or in combination with Bobo.

In view of the foregoing, reconsideration of the application is requested. It is submitted that the claims as presented herein patentably distinguish over the applied references and fully meet the requirements of 35 U.S.C. §112. Accordingly, allowance of claims 1-10, to include withdrawn claims 6 and 7 drawn to a non-elected species, is respectfully solicited.

Should the Examiner believe anything further is needed in order to place the application in condition for allowance, he is requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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JAO\RAM:amw

Attachment:
Appendix

Filed: October 4, 2001

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APPENDIX

Changes to Specification:

Page 3, lines 10-21:

Referring now to Figure 1, there is shown a radial view through part of the first, high pressure turbine stage of a bypass gas turbine aeroengine. A section of a generally cylindrical engine outer casing is indicated schematically at 2, and an adjacent section of a concentric inner casing, likewise schematically, at 4. An annular space 6 between the outer and inner casings 2,4 constitutes the engine bypass duct. On the left (upstream) side of Figure 1 is shown part of an upstream nozzle guide vane 18 extending radially across a hot gas path 3 between an outer vane platform 16 and a concentric inner vane platform (not shown). As will be understood, the illustrated guide vane 18 is one of a series of guide vanes extending radially between the concentric vane platforms and which together with the platforms ~~from~~form the outlet nozzle guide vane annular. The inner surfaces (ie those facing into the gas flow 3) of the vane platforms are smooth-flow walls.

Page 5, line 22-page 6, line2:

The circumferential flange 4840 is provided with a series of axial apertures 76, each in approximate axial alignment with a corresponding aperture 68 in the shroud liner segment 24, thus enabling relatively cool high pressure compressor air to pass from the annular volume 19 through the apertures 68 into the interior of the box liners. This air then exits the interior of box liner segment 24 through aperture(s) 74 into the inter-liner gaps 78. The cross-sections of apertures 76 and 68 will be chosen so that despite the radial position of the shroud liner segment 24 there will be a

sufficient overlap between the apertures 76 and 68 for high pressure compressor air to flow therethrough. The rate at which air exits the box liners is determined, ie metered, by the exit apertures 74.

Changes to Claims:

The following are marked-up versions of amended claims 1 and 8:

1. (Twice Amended) A pressure actuated tip clearance system for a shroud structure of a gas turbine rotary stage including an annular plenum chamber formed between an annular arrangement of a plurality of shroud liners on the inner circumference of the chamber and a generally cylindrical casing on the radially outer side, and, in use, a hot gas stream located radially inwards of the shroud liners, wherein each shroud liner comprises a hollow box section comprising upstream and downstream walls, radially inner and outer walls, and side walls, at least the downstream wall and the radially ~~inner and~~ outer ~~walls~~wall being closed, the upstream wall having an air inlet aperture, and at least one of the side walls having at least one outlet aperture, and a means for flow communication providing flow communication between the inlet aperture and a source of high pressure air at a pressure higher than that of the hot gas stream.

8. (Amended) A tip clearance system as claimed in claim 1 wherein there is further provided a bleed aperture leading from the interior of the shroud liner to a radial clearance gap immediately upstream of the shroud liner and extending from the gas stream to the ~~plenuy~~plenum chamber, whereby, in use, high pressure air from within the shroud liner exits through the bleed aperture and inhibits the passage of hot gas from the gas stream into the plenum chamber.